The Burrowing Bugs of Hawaii, with Description of a New Species (Hemiptera: Cydnidae)

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The Hawaiian fauna now contains four species of burrowing bugs, each belonging to a separate genus and each introduced: A wide ranging species of southern Asia and many Pacific islands; a Formosan species; a native of the Greater Antilles and the southern tip of Florida; and one species, apparently undescribed, closely related to certain forms occupying lands around the Indian Ocean. Undoubtedly all arrived on the Hawaiian Islands as unwitting passengers on man's transportation vehicles.

The four species may be separated by the key at the end of the text or by careful comparison with the accompanying illustrations (figs. 1-6). On the latter the critical points are the number and kinds of spines occurring submarginally on the head; the shape of the cuticular modification associated with the scent gland opening on the metapleuron; and the shape and extent of the evaporative areas (stippled) on the meso- and metapleura.

Genus **Geotomus** Mulsant and Rey, 1866

1866 *Geotomus* Muslant and Rey, Ann. Soc. Linn. Lyon, new series, 13:324. Type -species, *Cydnus punctulatus* Costa, a junior synonym of *caucasicus* Kolenati, subsequent fixation by Distant (1902:98).

Geotomus pygmaeus Dallas, 1851 (figs. 1,2)

1851 *Geotomus pygmaeus* Dallas, List Hemip. Brit. Mus., 1:290 [India].
1877 *Geotomus jucundus* White, Ann. Mag. Nat. Hist., ser. 4, 20:110 [Hawaii].
1877 *Geotomus subtristis* White, Ann. Mag. Nat. Hist. ser. 4, 20:111 [Hawaii].
1878 *Geotomus subtristis*: White, Ann. Mag. Nat. Hist. ser. 5, 1:365 [Hawaii].
1878 *Geotomus jucundus*: White, Ann. Mag. Nat. Hist., ser. 5, 1:365 [Hawaii].
1888 *Geotomus subtristis*: Blackburn, Proc. Linn. Soc. New S. Wales, ser. 2, 3:344 [Hawaii].
1902 *Geotomus pygmaeus*: Kirkaldy, Fauna Hawaiiensis, 3(2):172 [Hawaii; etc.].
1902 *Geotomus pygmaeus*: Distant, Fauna Brit. India, Rhychota I:99 [Hawaii; etc.].

1907 *Geotomus pygmaeus*: Kirkaldy, Proc. Hawaiian Entomol. Soc., 1:139, 145-146 [Hawaii, etc.].
1908 *Geotomus pygmaeus*: Kirkaldy, Proc. Hawaiian Entomol. Soc., 1:187 [Hawaii, etc.].
1927 Geotomus pygmaeus: Illingworth, Proc. Hawaiian Entomol. Soc., 6:392 [Hawaii; etc.].
1931 *Geotomus pygmaeus*: Williams, Handb. insects etc. Hawaiian sugar cane fields, pp. 97-98 [Hawaii].
1931 *Geotomus pygmaeus*: Illingworth, Proc. Hawaiian Entomol. Soc., 7:378 [Hawaii].
1935 *Geotomus pygmaeus*: Wu, Catal. Ins. Sinensium, 2:270 [Hawaii; etc.].
1936 *Geotomus pygmaeus*: Van Duzee, Proc. Hawaiian Entomol. Soc., 9:219 [Hawaii].
1944 *Geotomus pygmaeus*: Krauss, Proc. Hawaiian Entomol. Soc., 12:83 [Hawaii].
1945 *Geotomus pygmaeus*: Fullaway and Krauss, Common Insects of Hawaii. p. 50 [Hawaii].
1948 *Geotomus pygmaeus*: Zimmerman, Insects Hawaii, 3:26 [Hawaii; etc.].
1951 *Geotomus pygmaeus*: Usinger, Proc. Hawaiian Entomol. Soc., 14:321 [Hawaii; etc.].
1953 *Geotomus pygmaeus*: Box, List sugar cane insects, p. 36 [Hawaii; etc.].
1959 *Geotomus pygmaeus*: Yoshimoto, Proc. Hawaiian Entomol. Soc., 17:18 [Hawaii].
1960 *Geotomus pygmaeus*: Suehiro, Proc. Hawaiian Entomol. Soc. 17:292 [Hawaii (Midway I)].
1961 *Geotomus pygmaeus*: Butler, Proc. Hawaiian Entomol. Soc., 17:382 [Hawaii (Laysan 1.)].
1966 *Geotomus pygmaeus*: Beardsley, Proc. Hawaiian Entomol. Soc. 19:162, 180. [Hawaii (Nihoa I., Pearl and Hermes Reef)].
1970 *Geotomus pygmaeus*: Anonymous, Proc. Hawaiian Entomol. Soc., 20:500 [Hawaii].

This species, originally described from India, is common in southeastern Asia and many islands of the Pacific. It was already common and widespread in Hawaii by 1878 when White (p. 365) wrote about it under the name *G. jucundus* as "living under stones and about the roots of herbage, and not confined to the mountains." Illingworth (1927:392) found it among the roots of pineapple plants. Williams (1931) reported it as "occasional in [sugar] cane fields", in the same year Illingworth (1931:378) wrote that they came to light in numbers and were a nuisance in exuding a "vile" odor and in piercing human skin with their proboscis. Box (1953) wrote that it "feeds on tissues" of sugar cane. As summarized by Zimmerman (1948:26) it is known from the islands of Hawaii, Kauai, Lanai, Maui, Molokai and Oahu, to which Butler (1961) added Laysan I., Suehiro (1960) added Midway, and Beardsley (1966) added Nihoa I., and Pearl and Hermes Reef; all in the Leeward chain.

Genus **Rhytidoporus** Uhler, 1877

1877 *Rhytidoporus* Uhler, Bull. U.S. Geol. Geogr. Surv. Terr., 3:380. Type-species, *Rhytidoporus identatus* Uhler, only included species.

Rhytidoporus identatus Uhler, 1877 (Figs. 5,6)

1877 *Rhytidoporus indentatus* Uhler, Bull. U.S. Geol. Geogr. Surv. Terr., 3:380 [Cuba; southern Fla.].

1970 *Rhytidoporus indentatus*: Anonymous, Proc. Hawaiian Entomol. Soc., 20:500, 596 [Hawaii; etc.].

1975 *Rhytidoporus indentatus*: Shiroma, Proc. Hawaiian Entomol. Soc. 22:24 [Hawaii (Oahu)].

The first Hawaiian records of this species were published in 1970 (supra) based on several specimens taken in light trap collections from Hilo, island of Hawaii, as early as October 6, 1969.

This insect is a native of the Greater Antilles. It was already established in southern Florida at the time of its description in 1877. Certainly the giant step to Hawaii, approximately 5,000 miles, could have been effected only by one of man's travelling machines.

Genus **Microporus** Uhler, 1872

1872 *Microporus* Uhler, in Hayden, Prelim. Rept. U.S. Geol. Surv. Mont., p. 394. Type-species, *Microporus obliquus* Uhler, only included species.

Pending completion of certain generic studies now in progress, the genus *Microporus* is here used in the broad sense of several authors (not Froeschner, 1960). In this sense the genus can be characterized by the combination of its short stout shape; 5-segmented antennae; presence of a complete, row of close-set setigerous punctures submarginally along the anterior margin of the head, with the vestiture arising therefrom consisting of both short stout spines and markedly longer slender hairs; and the apex of the peritreme forming an ear-shaped loop with the scent canal opening as a pore ventrally at the base of that auricle.

As thus defined the genus is divisible into a number of units, each worthy of generic status. Names are already available for a few of these, but the classification of this part of the family is so unequal that I prefer the simpler inclusive definition at this time.

In spite of the less than satisfactory generic concept of *Microporus* used here and my firm belief that this species was introduced into Hawaii from elsewhere, this recently collected species needs a name, under which accumulating data can be stored. My studies of Cynidae in American and European museums (made possible by NSF Grant, G7118) found no previously described species to include this one so I herewith describe it as new.

Microporus shiromai Froeschner, new species (Figs. 3,4)

Diagnosis: Among those species of the genus (sensu supra) with the narrow scutellar apex (width less than half length of coriomembranal suture) and the presence of a single longitudinal row of 2-3 submarginal setigerous tubercles along each side of most of the abdominal segments, this one may be recognized by the combination of the virtually impunctate head, the reduced and obscurely delimited metapleural evaporatorium, and the wholly black color.

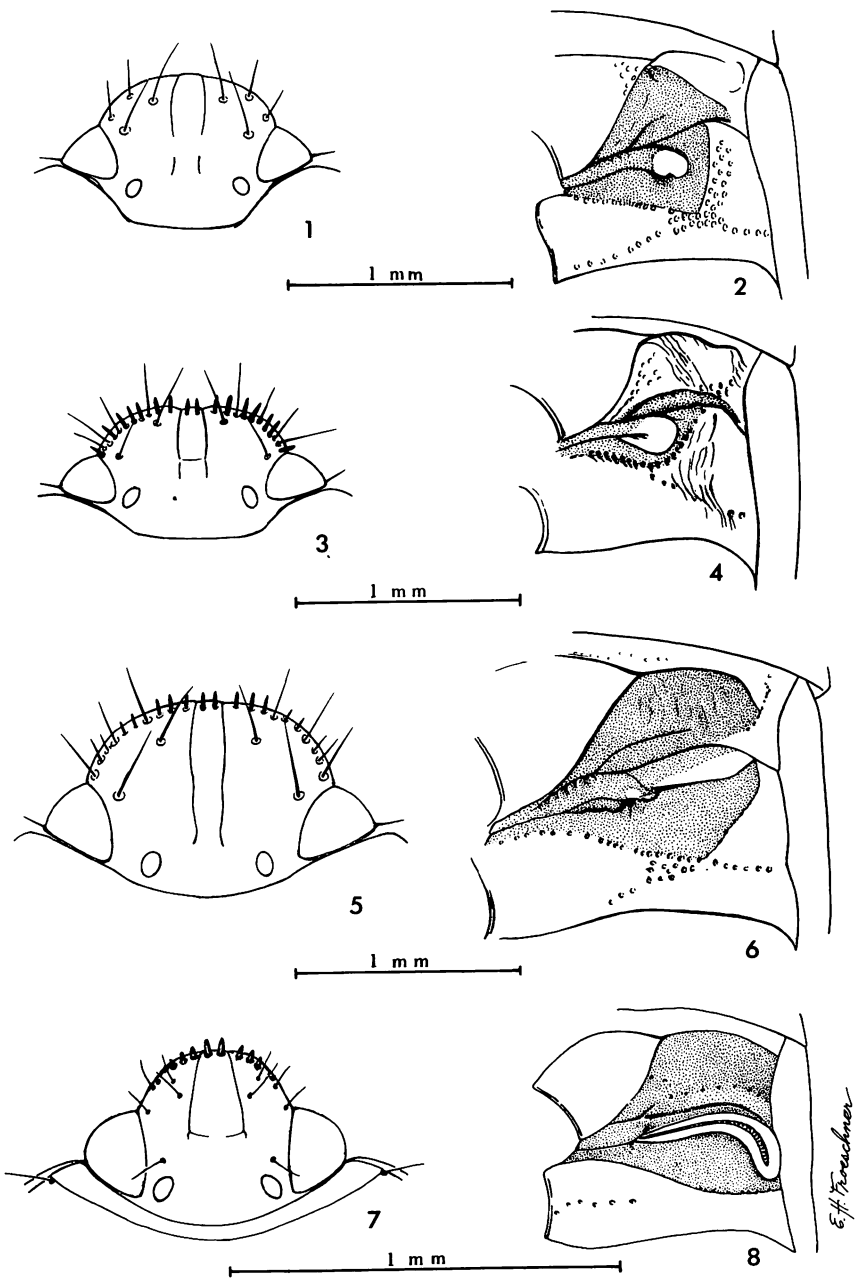
Holotype male: Length 4.1 mm. (all following measurements given in millimeters). Broadly oval, widest slightly behind midlength.

Head: wider than long, 1.04: 0.66; interocular width 0.60. Anterior margin a slightly flattened semicircle. Juga very slightly longer than clypeus. Ocelli large, separated from an eye by a space slightly wider than an ocellus. Surface polished. Vertex obsoletely punctured. Juga with scattered fine punctures and coarse, radiating rugae; submarginally with a complete row (from eye to apex) of setigerous punctures, the setae of 2 sizes: short and stout or very long and slender. Clypeus with 2 subapical setigerous punctures, each bearing a short, stout spine. Bucculae lower than height of labial segment II, evanescent at both ends. Labium reaching between bases of middle coxae, the segments measuring as follows: I, 0.33; II, 0.43; III, 0.28; IV, 0.23; second segment somewhat compressed, not foliaceous. Antennal segments measuring: I, 0.20; II, 0.13; III, 0.17; IV, 0.16; V, 0.16.

Pronotum: Length more than half width, 1.23:2.30; surface polished, site of obsolete transverse impression, anterior half of posterior lobe, and lateral slopes of anterior lobe with irregularly scattered coarse punctures, laterally these interspersed with more or less distinct very minute punctures; subapical punctures few, virtually obsolete. Anterior lobe between calli with a broad, elongate, rectangular impression. Lateral margins converging from base, abruptly and convexly so on apical fourth; with a submarginal row of 30 close-set setigerous punctures, each bearing a long, tapering hair. Posterior margin mostly weakly convex.

Scutellum: As broad as long, 1.43: 1.43; surface polished and, except across basal sixth, with numerous moderately large separated punctures interspersed with scattered minute punctures. Apex narrowly rounded, its width at inner basal angles of coria less than half the length of the coriomembranal suture.

Hemelytron: Polished; areas well delimited. Clavus with one complete row of strong punctures and basal parts of 2 others. Mesocorium with 2 complete rows of strong punctures paralleling clavocorial suture, the row closest to that suture distinctly impressed; remainder of surface with numerous, well separated strong punctures becoming slightly coarser toward base. Excorium with most punctures crowded into a row along inner or outer margins. Costa strongly convex dorsally, delimited interiorly along basal two-thirds by a strongly impressed line; with 15-close-set, coarse setigerious punctures, each bearing a long slender, tapering hair. Outer apical angles of corium broadly prolonged for a very short distance. Membrane slightly longer than basal width, surpassing apex of abdomen by about one-fifths its own length.



Heads and meso- and metapleura: *Geotomus pygmaeus*, Figs. 1 and 2; *Microporus shiromai*, Figs. 3 and 4; *Rhytidoporus indentatus*, Figs. 5 and 6; *Chilocoris pusillus*, Figs. 7 and 8.

Propleuron: Nearly shining, impunctate. Prosternal carinae very low, about one-fourth height of labial segment II. Mesopleuron shining, inner two-thirds with several oblique striae; posteriorly with strong punctures becoming denser in posterior lateral angle; evaporatorium reduced to a very narrow band along posterior margin. Metapleuron with terminal shining modification of peritreme forming a large auricle with ventrally visible osteolar pore at the middle of its inner base, this auricle broader than the space between itself and the limiting suture of the posterior lamella; evaporatorium reduced to a narrow rim around the peritreme; surface lateral to auricle with an area of longitudinal rugae and a few punctures; lateral fourth polished, impunctate.

Legs: Short; diameter of tarsal segment II about equal to that of segments I and III. Anterior tibia moderately widened, not produced beyond tarsal insertion; with 7 strong, tapering spines along dorsal margin. Middle and hind tibiae terete, latter with spines of ventral row slightly thinner and a little longer than spines along dorsal margin.

Sternites: Shining, with a few obsolete rugae and punctures in spiracular area. First visible segment without lateral submarginal setigerous tubercles, remaining visible segments (II-V) each with 2 small, submarginal setigerous tubercles on each side.

Genital capsule opening dorsally, about half as high as wide; medially with a large, poorly defined, shallow impression causing apical margin to appear slightly protuberant; apical margin entire.

Color: Shining black; appendages brownish; tarsi dirty yellow.

Female: Similar to male except lacking pronotal impression.

Type data: Holotype male take in black light traps at Hickam Air Force Base, island of Oahu, Hawaii, May 12, 1971, by Edward S. Shiroma. Paratypes:—same data as holotype, 9 males, 8 females; Barbers Point Naval Air Station, island of Oahu, Hawaii, May 16, 1971, taken in black light traps by Edward S. Shiroma, 44 males, 83 females. The entire type series is quite uniform except that teneral individuals are brown to brownish black.

Such a conspicuous insect which comes to light traps could hardly have escaped detection so long in this diligently collectly area. Undoubtedly, its occurrence on the island represents a recent introduction. The fact that Hawaii is situated on the trans-Pacific routes of many ships and aircraft between North America and Asia leads one to look to either of these continents as the possible homeland of this new species. The combination of the enlarged auricular peritreme and the narrow scutellar apex (width less than half the length of the coriomembranal suture) is not duplicated in genera in the Western Hemisphere, but is found in a few Asiatic and several African genera of burrowing bugs. This suggests an Old World origin of the species, but gives no clue to a particular part thereof.

Mr. Shiroma recognized the unusualness of these specimens and submitted them for determination. It is appropriate that the species be named in recognition of his role in discovering it.

Genus **CHILOCORIS** Mayr 1864

1864 *Chilocoris* Mayr. Verh. Zool. Bot. Gesell. Wien, 14:907. Typespecies, *Chilocoris nitidus* Mayr, monotypy.

Chilocoris pusillus Horvath 1919 (Figs. 7, 8)

1919 *Chilocoris pusillus* Horvath, Ann. Mus. Nat. Hungary, 17:262 (Formosa).

A single specimen, collected by J.L. Gressitt, was taken from a Malaise Trap located at Honakohua, on the western part of Maui, March 19, 1972.

This tiny species, previously known only from the type material from Formosa, fits very well my notes on the syntypes of Horvath, and equally fits his original description except for body length. There the length and width are given as "Long, corp. 1 5/6, Lat. 1 1/6 mill." These measurements imply a subrounded form whereas each syntype is almost twice as long as wide; the length should have read "2.6" millimeters and the width 1.5 millimeters. The Horvath specimens were made available to me in Vienna through the generous cooperation of Drs. Max Beier and A. Soos and I herewith express my sincere appreciation to both men and to the National Science Foundation which supported that study trip through Grant G7118.

KEY TO THE BURROWING BUGS OF THE HAWAIIAN ISLANDS

1. Pronotum with a subapical impressed line following anterior margin across full width (fig. 7). Scent gland peritreme extending laterally as elevated polished band, slightly surpassing lateral margin of supporting plate, there forming a posteriorly curved rounded lobe (fig. 8) . . . . . *Chilocoris pusillus* Horvath

   Pronotum without a subapical impressed line (figs. 1, 3, 5). Scent gland peritreme not reaching lateral margin of supporting plate (figs. 2, 4, 6) 2

2(1.) Costal margin of corium with 15 or more setigerous punctures along basal three-fifths or more. Apex of peritreme forming an earlike loop with the scent pore opening ventrally at its base (Fig. 4) . . . . . *Microporous shiromai* Froeschner, new species

   Costal margin of corium with 0-3 setigerous punctures restricted to basal half or less. Apex of peritreme not earshaped, scent pore opening posteriorly under ledge 3

3(2.) Head anteriorly with a submarginal row of numerous, crowded setigerous punctures extending from eye to eye, spines arising from middle of this row short and stout, thence becoming finer toward eyes and with a few very long slender hairs between (Fig. 5). Apex of peritreme appearing as a polished transverse band (delimited posteriorly by a sharp carina) completely transversing the metapleural evaporative area and joining lateral polished area (Fig. 6) . . . . . *Rhytidoporus indentatus* Uhler

   Head anteriorly with only 2 or 3 submarginal setigerous punctures, each giving rise to a long, slender hair (Fig. 1); Apex of peritreme appearing as a short shining kidney-shaped (posteriorly concave) structure separated from lateral polished area by dull evaporative area (Fig. 2) . . . . . *Geotomus pygmaeus* Dallas

References

Anonymous. 1970. Rhytidoporus indentatus Uhler (Notes and Exhibitions). Hawaiian Entomol. Soc., 20:500.

———1970. Chance Immigrants. Proc. Hawaiian Entomol. Soc., 20:597

Blackburn T. 1888. Notes on the Hemiptera of the Hawaiian Islands. Proc. Linn. Soc. New South Wales, ser. 2, 3:343-354.

Box, H.E. 1953. List of sugar cane insects. Commonwealth Inst. Entomol., London. 101 pp.

Butler, G.D., Jr. 1961. Insects and other Arthropods from Laysan Island. Proc. Hawaiian Entomol. Soc., 17:379-387.

Dallas, W.S. 1851. List of the specimens of hemipterous insects in the collection of the British Museum, Pt. I. 368 pp., 11 pls.

Distant, W.L. 1902. Fauna Brit. India, including Ceylon and Burma. Rhynchota I.

Fullaway, D.T. and Krauss, N.L.H. 1945. Common insects of Hawaii. 228 pp. ² 12 pls. Honolulu, Hawaii.

Froeschner, R.C. 1960. Cydnidae of the Western Hemisphere. Proc. U.S. Nat. Mus., 111:337-680.

Horvath, G. 1919. Analecta ad cognitionem cydnidarum. Ann. Hist.-Nat. Mus. Nat. Hungarici, 17:205-273.

Illingworth, J.F. 1927. A report on insects and other animal organisms collected in the pineapple growing section of Mauna Loa, Molokai, June 1929, Proc. Hawaiian Entomol. Soc., 6:390-397.

———1931. (Note). Proc. Hawaiian Entomol. Soc., 7:378.

Kirkaldy, G.W. 1902. Hemiptera. Fauna Hawaiiensis. 3(2):93-174, pls. iv and v.

———1907. Biological notes on the Hemiptera of the Hawaiian Isles. No. 1. Proc. Hawaiian Entomol. Soc., 1:135-161.

———1908. A list of the described Hemiptera (excluding Aleyrodidae and Coccidae) of the Hawaiian Islands. Proc. Hawaiian Entomol. Soc., 1:186-208, pl. 4.

Krauss, N.L.H. 1944. Notes on insects and other Arthropods from the islands of Molokai and Maui, Proc. Hawaiian Entomol. Soc. Hawaii; 12:81-94.

Mayr, G.L. 1864. Diagnosen neuer Hemipteren. Verh. Zool. Bot. Gesell. Wien, 14:903-914.

Mulsant, E. and Rey, C. 1866. Histoire naturelle des Punaises de France, les Cydniens Ann. Soc. Linn. Lyon, new series, 13:293-367.

Uhler, P.R. 1872. Notices of the Hemiptera of the Western Territories of the United States. *in* Hayden, Prelim. Rept. U.S. Geol. Surv. Mont., pp. 392-423.

———1877. Report on the insects collected by P.R. Uhler during the explorations of 1875. Bull. U.S. Geol. Geogr. Surv. Terr., 3:355-475, 765-801, pls. 27-28.

Usinger, R.L. 1951. Heteroptera of the Marshall Islands. Proc. Hawaiian Entomol. Soc., 14:315-321.

Van Duzee, E.P. 1936. A report on some Heteroptera from the Hawaiian Islands, with descriptions of new species. Proc. Hawaiian Entomol. Soc., 9:219-229.

White, F.B.W. 1877. Descriptions of new species of Heterop. Hemip. coll. Hawaiian Islands by Blackburn, No. 1, Ann. Mag. Nat. Hist., ser. 4, 20:110-114.

———1878. Descriptions of new species of Heterop. Hemip. coll. Hawaiian Islands by Blackburn, No. 2. Ann. Mag. Nat. Hist., ser. 5, 1:365-374.

Williams, F.X. 1931. Handbook of the Insects and Other Invertebrates of Hawaiian Sugar Cane Fields. Hawaiian Sugar Planters' Assoc., 400 pp.

Wu, C.F. 1935. Catalogus Insectorum Sinensium. vol. 2, i-vi, 1-634.

Yoshimoto, C.Y. 1959. Trapping air-borne insects. Proc. Hawaiian Entomol. Soc., 17:18.

Zimmerman, E.C. 1948. Insects of Hawaii. Heteroptera. Univ. of Hawaii Press, Honolulu. ix ² 255 pp.